

WHAT IS CLAIMED IS:

1. An optical fiber, said fiber having a core and a sheath, said sheath having at least one parameter that varies from an input end of said fiber to an output end thereof in a manner to maintain a constant power loss per unit length over the length of said fiber.
2. An optical fiber as in claim 1 wherein said core is fabricated in a manner to be sensitive to a target chemical.
3. An optical fiber as in claim 1 wherein said sheath includes a cladding and said cladding is fabricated in a manner to be sensitive to a physical quantity.
4. An optical fiber as in claim 1 wherein said core is fabricated in a manner to be sensitive to a physical quantity.
5. An optical fiber as in claim 1 wherein said sheath includes a cladding and said cladding is fabricated in a manner to be sensitive to a target chemical.
6. An optical fiber as in claim 1 wherein said one parameter comprises an increase in the diameter of said core from said input end to said output end.
7. An optical fiber as in claim 1 wherein said one parameter comprises the core/cladding refractive index ratio.
8. An optical fiber as in claim 1 wherein said one parameter comprises an increase in the absorption coefficient of said fiber from said input end to said output end.
9. A multi-mode optical fiber, said fiber having a core and a cladding, said cladding being permeable and including a composition sensitive to a target chemical, said fiber having at least one parameter that varies as a function of position in said fiber to maintain uniform the level of sensitivity of the reaction between said composition and said target chemical.

10. An optical fiber as in claim 9 wherein said at least one parameter comprises the core/cladding refractive index ratio and said ratio increases as a function of distance from an input end of said fiber.
11. An optical fiber as in claim 9, wherein said cladding includes said composition therewithin.
12. An optical fiber as in claim 9 including a coating on said cladding wherein said coating includes said composition.
13. An optical fiber as in claim 10 wherein said cladding includes said composition therein, said fiber including means for introducing light into said input end.
14. An optical fiber as in claim 12, said fiber including means for introducing light into said input end.
15. An optical fiber as in claim 13 also including a light sensor at an output end thereof.
16. An optical fiber as in claim 14 also including a light sensor at an output end thereof.
17. An optical fiber, said fiber having a core and a cladding, said cladding being fabricated to be sensitive to a physical quantity, said fiber having at least one parameter that varies from an input end to an output end in a way calculated to make the power loss vary in a controlled way over the length of the fiber.
18. An optical fiber as in claim 17 wherein said one parameter comprises an increase in the diameter of said core from said input end to said output end.
19. An optical fiber as in claim 17 wherein said one parameter comprises the core/cladding refractive index ratio.

20. An optical fiber as in claim 17 wherein said one parameter comprises an increase in the scattering coefficient of said fiber from said input end to said output end.
21. A distributed fiber optic sensor comprising a multi-mode fiber having a core and a permeable cladding, said cladding including a composition responsive to an external material to generate a light signal characteristic of that response, said fiber having at least one parameter that varies as a function of position within the fiber to compensate for any non-linear power loss over the length of said fiber.
22. An optical fiber as in claim 21 wherein said one parameter comprises an increase in the diameter of said core from said input end to said output end.
23. An optical fiber as in claim 21 wherein said one parameter comprises the core/cladding refractive index ratio.
24. An optical fiber as in claim 21 wherein said one parameter comprises an increase in the absorption coefficient of said fiber from said input end to said output end.
25. An optical fiber as in claim 21 wherein said composition is characterized by an increase in scattering coefficient from an input to an output end of said fiber.
26. An optical fiber as in claim 21 also including a light sensor at an output end thereof.
27. An optical fiber as in claim 26 said fiber having a light source at the input end thereof.